

# Honeywell Pressure Sensor Products



## RDD100 Remote Digital Display User Manual

**Honeywell**

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## 1 INTRODUCTION

### 1.1 Product Overview

The Honeywell Remote Digital Display, RDD100, produces a digital display of measured pressures and is designed for use with RS-232 versions of Honeywell HPA, HPB, PPT, PPTe, and PPTR pressure transducers. The 6-digit display features 0.56 inch-tall LED characters that are readable in bright sunlight. The RDD100 is a digital-input instrument, accepting a continuous stream of digital data transmitted in RS-232 format from the transducer. The transducer may be installed at the source of the pressure being measured; a cable up to 50 feet in length may separate the transducer from the RDD100. A wall-mounted AC-to-DC power supply, which powers both the RDD100 and the transducer, is supplied with the display. Alternatively, a user may provide 12V  $\pm$  3V DC from a system power supply.

The RDD100 has a 9-pin "D" connector mounted on the rear panel to connect to a personal computer. The computer can perform data collection while the RDD100 is continuously displaying readings. The computer can also be used to send commands to the transducer (two-way communications).

The RDD100 is housed in a compact enclosure, measuring approximately 3.8 x 2 x 4.4 inches, W x H x D. The instrument may be used on a tabletop or can be easily installed in a panel using the supplied mounting hardware.

### 1.2 Pressure Transducer Description

The RDD100 receives pressure readings from an RS-232, Honeywell pressure transducer (HPA, HPB, PPT, PPTe and PPTR). Accuracy of the displayed pressure reading is determined solely by the accuracy of the transducer. Typical PPT accuracy, for example, is  $\pm 0.05\%$  of full scale (FS). Digital output resolutions up to 0.0011% FS are possible but are dependent upon the pressure display units selected. Although many of the support transducers also have a 0-5V analog output, only the digital output is used by the RDD100 as it provides better resolution and accuracy. Any of 16 different pressure display units may be selected for use with the RDD100. A list of available pressure units is shown in section 2.4 below. A more complete description of the Honeywell transducers can be found in their respective user manuals. See <http://www.pressuresensing.com>.

## 2 EQUIPMENT SET UP

### 2.1 Cables & Connections

Figure 1 shows connections that must be made between the RDD100 and Honeywell RS-232 pressure transducer. A six foot long cable for this connection is supplied with the RDD100. Figure 1 also shows connections to the 12V DC input power. To obtain transducer pressure readings, only these two connections are needed. Figure 1 also shows a connection to a personal computer. This connection may be used for data logging or to communicate with the transducer in order to set up and change various parameters (display units, integration time, idle count, etc). A six or ten foot long computer-to-RDD100 cable can be selected when the RDD100 is ordered.

### 2.2 Personal Computer Set Up

The RS-232 transducer must be configured to send continuous readings to the RDD100 in order for pressure readings to appear. The display will remain blank and the error LED will be lit continuously when the RDD100 fails to receive continuous input from a transducer.

Transducers ordered with the RDD100 will be configured at the factory to function properly with the RDD100. A transducer that has not been configured for continuous readings can be configured for use with the RDD100 by connecting it to the COMM port of a PC as shown in Figure 1. The HPA/B, PPT, PPTR/E Demo program or a terminal emulator program such as *HyperTerminal*, may be used to send RS-232 formatted serial data to the COMM port.

The Demo program or PC terminal emulator port parameters should be set up as follows:

|            |      |
|------------|------|
| Baud Rate  | 9600 |
| Start Bits | 1    |
| Data Bits  | 8    |
| Stop Bits  | 1    |
| Parity     | None |
| Local Echo | On   |

Also, configure the program to attach a line feed to the carriage return. This completes the set up of the PC terminal emulator.

Next, the transducer must be configured to match the above terminal emulator settings. (Settings listed above are the factory default settings for the HPA, HPB, PPT, PPTe and PPTR, and are therefore likely to be correct.)

## 2.3 Set Transducer Baud Rate

When a Honeywell digital transducer, connected to a computer as described above, is first powered up a start-up message will be sent from the transducer. If the transducer baud rate is not set at 9600, either no message or a garbled message will be received. In this case, it will be necessary to try other baud rates until a match is found. Possible baud rates for the HPA, HPB, PPT, PPTR and PPTe are: 1200, 2400, 4800, 9600, 14400, 19200, and 28800. Once a match is found, the transducer can be changed to a baud rate of 9600, which will allow it to communicate with the RDD100 instrument.

The procedure for changing and then storing a new baud rate for the transducer is shown below. The commands below all use a broadcast address (99) to allow them to operate correctly even if the transducer address has been changed from the factory default setting, which is address 01.

With the PC and transducer operating at the baud rate found to return a non-garbled start-up message:

```
Type *99we<cr>      (Carriage Return)
Resp *99WE          (Command Echo)
Type *99bp=n9600<cr>
Resp *99BP=N9600   (Command Echo)
```

This will change the transducer to 9600 baud with no parity. Once this command is executed, the PC will again lose communication with the transducer, since they will be on different baud rates. Do not power down the transducer at this point since the change is only temporary. The PC terminal emulator can now be changed to 9600 baud and should be able to communicate with the transducer. This can be checked by typing \*99p1<cr> which should return a single pressure reading.

Continue as follows in order to store the new baud rate and parity into the transducer EEPROM:

```
Type *99we<cr>
Resp *99WE          (Command Echo)
Type *99sp=all<cr> (Store Parameters Command)
Resp *99SP=ALL      (Command Echo)
```

After cycling power to the transducer it should now communicate with the PC, set at 9600 baud.

## 2.4 Setting Transducer Display Units:

### Inquiry for the current display units

```
Type *99du<cr>
Resp ?01DU=PSI    (If transducer factory defaults have not been changed.)
Resp *99DU        (Command Echo)
```

To change the display units:

```
Type *99we<cr>
```

Resp \*99WE (Command Echo)  
 Type \*99du= {selection-see DU list below}

(A list of available pressure display units can also be found in the associated transducer User's Manual.)

Resp \*99DU= {selected display units} (Command Echo)

### Display Units List

| Display Unit | PSI Multiplier   | Units Description                          |
|--------------|------------------|--|
| ATM          | 0.068046         | ambient atmosphere at sea level            |
| BAR          | 0.068948         | bar ( $10^5$ newtons/meter <sup>2</sup> )  |
| CMWC         | 70.304           | centimeters of water column (4°C)          |
| FTWC         | 2.3065           | feet of water column (4°C)                 |
| INHG         | 2.0360           | inches of mercury (0°C)                    |
| INWC         | 27.679           | inches of water column (4°C)               |
| KGCM         | 0.070307         | kilograms/centimeters <sup>2</sup>         |
| KPA          | 6.8948           | kilopascal                                 |
| MBAR         | 68.948           | millibar (1 hectopascal)                   |
| MMHG         | 51.714           | millimeters of mercury (0°C) or torr       |
| MPA          | 0.0068948        | megapascal                                 |
| MWC          | 0.70304          | meters of water column (4°C)               |
| PSI          | 1.0000           | pounds per square inch                     |
| USER         | 0.0010000-999.99 | user supplied                              |
| LCOM         | FS=60000         | logic common value <sup>(1)</sup>          |
| PFS          | FS=100.000       | percent of full scale in 0.001% Increments |

<sup>(1)</sup>The LCOM display unit (logic common) automatically switches the digital pressure output to a scale, which has 60000 as the full scale output. The output will have a decimal point in the same position as it was in the original psi scale. For example, when a 10 psia device is switched to DU=LCOM, the full scale digital pressure output will be 60.000, instead of 10.000. Also, a 500 psi device will output full scale 600.00 instead of 500.00. PFS generally provides the highest readout resolution available when using the RDD100 readout.

## 2.5 “Continuous Transmit” Mode

Type \*99we<cr>  
 Resp \*99WE (Command Echo)  
 Type \*99mo=p2<cr> (Continuous Pressure Transmit Command)  
 Resp \*99MO=P2 (Command Echo)

## 2.6 Changes Stored In EEPROM

Type \*99we<cr> (Write Enable Command)  
 Resp \*99WE (Command Echo)  
 Type \*99sp=all<cr> (Store Parameters Command)  
 Resp \*99SP=ALL (Command Echo)

## 2.7 Verifying Stored Parameters

After cycling power to the transducer the RDD100 should now display pressure readings in the selected display units. If there is a need to interrogate the transducer to observe its set-up parameters, this can be done using the following sequence:

Type \*99du<cr>  
 Resp \*99DU=INHG (If transducer is set to read inches of mercury)

Although the Display Units example was used, this method of interrogation will work with any of the set up parameters, listed above and in the associated User's Manuals.

**Note:** Since pressure units are not a part of the RDD100 display, the user may want to attach a sticker or some other indication of the pressure units either on or near the display window.



### 3 OPERATION

#### 3.1 Start Up Messages

When the RDD100 is powered up, it goes through a test of its display segments and its error LED. The error LED is located beneath the least significant digit of the display. All segments should light for a brief period and then the display transitions to “rdd100” followed by the message “rEAdY”.

If a transducer is properly set up and connected to the RDD100, pressure readings will appear on the display.

#### 3.2 Error Indications

##### 3.2.1 No Transducer Connected

If the RDD100 does not detect a transducer set to send continuous readings, the display will go through the segments and LED check, display “rdd100”, display “rEAdY” and then go dark with the error LED illuminated.

##### 3.2.2 Incorrect Baud Rate

If the RDD100 sees a transducer, set to the wrong baud rate, the display will go through the segments and LED check, display “rdd100”, display “rEAdY” and hold with the “rEAdY” message.

##### 3.2.3 Not Set Up To Continuously Transmit

If the RDD100 sees a transducer that has not been set up to continuously transmit, the display will go through the segments and LED check, display “rdd100”, display “rEAdY” and hold with the “rEAdY” message.

##### 3.2.4 Wrong Polarity Of DC Power

The RDD100 is equipped with the reverse polarity protection diodes at its power input. The instrument will operate with either polarity.

##### 3.2.5 Transducer Disconnected While Transmitting

If the transducer is disconnected while transmitting, the last reading received will remain on the display and the error LED will light, indicating that no further updates are being made. Reestablishing connection to the transducer will result in a continuation of reading updates and the error LED will turn off.

NOTE: the RDD100 may appear to be in this condition if the transducer has been programmed with a long integration time or idle count yielding long durations between readings. It is recommended that the transducer be programmed to provide 1 or more readings per second to prevent this possible confusion. (The typical factory default reading rate is 5/second.)

##### 3.2.6 Over/Under-Ranged Transducer Indications

In the event that a transducer, experiencing an applied pressure or temperature which is over or under the specified range, is connected to the RDD100, the following will be indicated:

##### Sequence #1:

If a transducer that is in an over/under ranged condition is connected to the RDD100 and then the power is applied to the RDD100, the result will be a start-up message that continuously displays “rEAdY”.

##### Sequence #2:

If the RDD100 is powered up and then an over/under ranged transducer is connected to the RDD100, the result will be a blank display and the error LED will light.

Once the over/under range condition is removed, normal operation of the RDD100 will be restored.

### 4 POWER REQUIREMENTS

4.1 Voltage.....12 ± 3 VDC

#### 4.2 Current

4.2.1 Operating.....170 mA (Transducer and RDD100 together)

4.2.2 @ Start-Up.....350 mA

4.3 Power Connection.....2.5 x 5.5 x 10 mm (I.D. x O.D. x length)

**5 OPERATING ENVIRONMENT**

- 5.1 Operating Temp Range.....-20°C to +60°C
- 5.2 Storage Temp Range.....-25°C to +85°C
- 5.3 Relative Humidity.....0% to 90%, non-condensing

**6 DIMENSIONS**

- 6.1 Overall.....3.8 in. W x 2.0in.H
- 6.2 Panel Cutout Dimensions.....3.58 in. W x 1.77in.H
- 6.3 Depth Behind Panel.....4.5 inches (not including connectors and cables)

**RDD100 Connections**

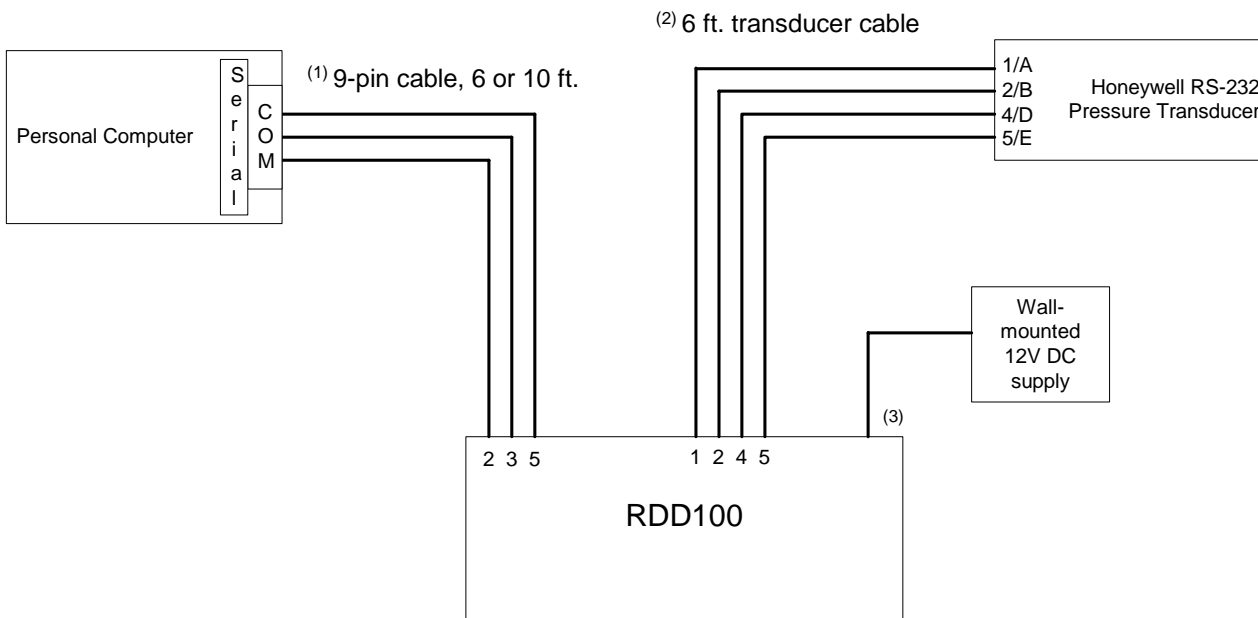


Figure 1, RDD100 Connections

(1) This cable allows a personal computer, with suitable software, to communicate through the RDD-100 to the transducer. Data can be logged and transducer parameters set/reviewed. Length of cable can be chosen when RDD100 is ordered. (At the PC, USB to RS-232 converters can be used.)

(2) Separate cables are available for transducers with Metal or Plastic electrical connectors. Standard cable length is 6 feet (1.8 m). Connectors may be purchased from Honeywell to construct custom-length cables. Due to RS-232 limitations, recommended maximum length is 50 ft (15 m).

(3) 12 VDC plug is 2.5 x 5.5 x 10 mm (I.D. x O.D. x length)  
Center pin may be either positive or negative polarity.

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